look for any explanation of these colour-variations, and that their wonderful differences rendered useless any study of them for systematic purposes. But further consideration seemed to show that all the variations, diverse as they were, might be explained by the combined influences of albinism, melanism, erythrism, and xanthism on a naturally variable species. In the present series melanism did not occur, as it did in some of the other described forms; but a greater or less degree of albinism might easily be responsible for the whitening of the muzzles, ears, feet, bellies, tails, and ultimately of the whole animal, and erythrism for the different degrees of red present on different specimens. Finally, xanthism, of which the best known instance was the common buff-coloured variety of the Mole, might be responsible for the buffy washing on the tail of specimen no. 5 described above.

If this explanation were correct, we should, after the elimination of the affected specimens, be able to look upon example no. 1 as the normal primitive form the colour of which might be accepted for comparison with that of allied species, just as if *S. finlaysoni* were no more variable than other Squirrels. A similar sort of elimination had to be practised in studying European Squirrels, among which the many individuals affected with melanism had to be withdrawn from consideration before any satisfactory study could be made of the local coloration.

Erythrism in Mammals, and especially in Squirrels [1], had often been observed before, while in combination with albinism it had been found to present an explanation of the remarkable colour-phenomena occurring in the Spotted Cuscus (*Phalanger maculatus*) [2].

The following papers were read:—

1. On the Species of the Genus *Millepora*: a preliminary Communication. By Sydney J. Hickson, M.A., D.Sc., F.R.S., F.Z.S.

[Received April 5, 1898.]

The phylum Cœlentera presents us with many families and orders of animals in which our knowledge of the characters which can be satisfactorily used for the purpose of systematic classification is singularly deficient. In the Madreporaria, the Gorgonacea, and the Milleporidæ the form of growth of the colony, the colour, and the structure of the hard skeletal parts are the only characters which have been used for the diagnosis of genera and species. In many cases it is probable that the diagnosis afforded by these characters should be considered to be satisfactory, but as the number of specimens in our museums

[1] *Cf.* P. Z. S. 1886, p. 77.
[2] Cat. Marsup. B. M. p. 199 (1888).

increases it becomes more evident that in others no satisfactory classification can be framed until we have a thorough knowledge of the anatomy of the polyps which construct these skeletons and of the canal-systems which bind them together into colonies.

In some genera of Madreporaria, for example, of which the skeletal characters only are known, a long series of intermediate stages can be found between the type specimens of the different species, and every new collection of specimens that is examined increases the difficulty of deciding whether a particular intermediate form belongs properly to one species or another. Moreover, in this same group the outlying species of one genus resemble the outlying species of another so closely that it is often a matter of great difficulty to determine, on our present system, to what genus a particular specimen belongs.

Nearly every important systematic work on these Cœlenterates contains some remarks about the difficulty of determining species, and examples are quoted of series of intermediate forms connecting closely allied species. If it were possible to frame some general rule for the correct definition of a species, which would be agreed to by all systematic zoologists, our task might be less difficult than it is; but, as matters stand, the conception of what is a species of one worker is so different from that of another that there is constantly going on a see-saw of construction and destruction of new species in our systematic literature.

I do not propose to attempt to define the conception "species" in Cœlenterates, but I think that all zoologists would agree that, if a form which is known as species A were proved to give rise to an embryo which grew into a form which had hitherto been known as species B, the two forms would have to be merged into one species with one specific name. Similarly, I imagine that all zoologists would agree that if a coral known as species X changed in the course of its life-history into a form known as species Y, then the forms X and Y should be regarded as one species and retain only one name. In the absence of any experimental proof that the embryo of one so-called species of coral gives rise, under any circumstances, to another so-called species, or that one so-called species changes in the course of its life-history into another, it is necessary to examine with very great care the anatomy of the soft parts as well as the skeletal structures, in order to determine whether it is possible or even probable that such changes actually occur in nature. If we find, then, that the polyps or reproductive organs of a coral with one form of growth are essentially different from those of another form, we may consider there is good reason for believing that such changes do not occur and the species founded on the skeletons are good; but if, on the other hand, the polyps, reproductive organs, and other characters of the two forms are essentially the same, then there is reason for believing that the species founded on skeletal characters may not be good.

Before proceeding further with this discussion of the characters which may be used for distinguishing species in Cœlenterates, it may be well to describe briefly the general results of my observations on the genus *Millepora*. This genus stands quite by itself among living corals. No one genus of the other Hydrocorallines can be confused with it, both the living tissues and the hard skeletal parts being perfectly distinct. It is widely distributed through the tropical seas, occurring in the Red Sea, Indian Ocean, Malay Archipelago, Tropical Australian waters, Pacific Ocean, and in the seas of the West Indies. It is essentially a shallow-water genus, living in abundance in most of the coral-reefs, and not occurring in greater depths than 15 fathoms.

The form varies immensely. It may be broadly lamellate or densely branched, or anastomosing, or it may form thin incrusting plates on dead corals. In all large collections of Millepores series of intermediate forms may be found between all the most prominent types.

The difficulty of defining and describing the species of this genus has been commented upon by several authors. Dana, for example, says "There is much difficulty in characterizing the Millepores on account of the variations of form a species undergoes and the absence of any good distinctions in the cells. The branched species are often lamellate at the base, owing to the coalescence of the branches, and the lamellate species as well as the branched sometimes occur as simple incrustations." My own investigations confirm and amplify Dana's statements on this point.

Notwithstanding these difficulties a large number of species of the genus have been described. In the writings of the older naturalists many species were described which have since been relegated to other classes of the animal kingdom, and in palæontological literature we find many species of fossil corals referred to the genus on erroneous or very unsatisfactory grounds.

Apart from all these, which may be left out of consideration in this paper, no less than 39 species of the genus *Millepora* have been described.

The characters which have been used for determining these species are:—(1) The form of the corallum. (2) The size of the pores. (3) The degree of isolation of the cycles. (4) The presence or absence of ampullæ. (5) The texture of the surface of the corallum.

(1) *The Form of the Corallum.*—This feature is even more unsatisfactory than I anticipated at the beginning of my investigation. In the first place, attention has been called by Dana, Duchassaing and Michelotti, and others to the fact that *Millepora* grows in an incrusting manner on many objects, and thereby assumes the form of the object on which it grows. It is quite easy to distinguish such forms as incrusting forms when they have only partially covered such objects as the horny axis of a *Gorgonia*, a glass bottle, or an anchor; but in many cases the object is so completely overgrown by Millepore and other marine

zoophytes that its presence is not discovered until a fracture is made. To give only one example to illustrate this point:—A specimen in the Manchester Museum was named *Millepora intricata*, and, on comparing it with the description of the species, I thought at first that the name was correct. On breaking it into two pieces, however, I found that the form it had assumed was due to the fact that it had grown over a small piece of wood.

In a still greater number of cases, however, the Millepores grow upon the dead coralla of other Millepores or Madrepores or other white corals, and then the difficulty of determining whether the form of the specimen is due primarily to the living coral or to the one on which it has grown becomes extreme. There is a large specimen in the collection brought home from New Britain by Dr. Willey, of very irregular form, one part of which has a form like that attributed to the species *M. plicata*, another part to the species *M. verrucosa*, but a broken knob shows quite clearly that a part of this great mass has grown over a dead coral. It would consequently be quite impossible to determine with any degree of satisfaction to which of the already-described species it belongs, unless every knob and projection were broken off to see whether the dead coral extends as a basis through the whole piece.

In the second place, the immense amount of variation in form which occurs in large specimens of *Millepora*, and, indeed, in many small specimens too, leads to very great difficulties in the determination of species which have been described on form as the principal character. In Dr. Willey's collection there is a series of varieties of growth leading from a massive lamellate form to a complicated branching and anastomosing form.

A careful study of these skeletons, then, points very definitely to the conclusion that the general form of the corallum of *Millepora* should be used, not as a primary, but as a very subsidiary character in the description of species.

The form assumed by the corallum must depend upon many circumstances connected with the exact spot on which it grows. If a *Millepora* embryo happens to become fixed on a large piece of dead coral, it will form a large incrusting base, and such a base nearly always gives rise to a lamellate form of growth; if, on the other hand, the embryo settles on a small stone or other object, lamellate growth is impossible, and the corallum will be ramified.

The growth of the corallum must also be influenced by the propinquity of other corals. Its form must be adapted to the space left between its neighbours on the crowded reef. Again, its form must be modified by the depth of the water in which the embryo happens to develop. As Duchassaing and Michelotti pointed out long ago, *Millepora* often grows in very shallow water and is consequently unable to develop in height. Specimens that happen to fix themselves on foreign bodies on the edge of the reef at a depth of 5 or 6 fathoms can and do grow to a very great length without impediment.

It is also extremely probable that the available food-supply, the particular set of the tides and currents, and the chemical composition of the sea-water, particularly as regards the amount of calcium carbonate it holds in solution, vary very considerably in different reefs and in different parts of the same reef. Such variations must affect the rate of growth of Millepores, and I think it is reasonable to believe the mode of growth also.

(2) *The Size of the Pores.*—Dana, Milne-Edwards and Haime, and Quelch have used the size of the pores as a specific character, but, with one exception to be referred to presently, they give no measurements, being contented to use the expressions "very small," "large," "minute," &c. Unless the zoologist has an immense number of specimens from different localities to compare one with another, it is difficult for him to understand what is meant by such expressions; but even the naturalists of the great national collections would be mystified by the case of *M. alcicornis*, whose gastropores are according to Quelch very large, and according to Milne-Edwards and Haime "très petits." I have measured a very large number of gastropores, taking for each specimen an average of 6 or 12.

The greatest average diameter of the gastropores I have found is 0·37 mm., the smallest is 0·13 mm., so that the difference between those pores which might legitimately be called "very large" and those that are "very small" is 0·24 mm. But these "large" pores are very rarely seen; the great majority of the gastropores are between 0·3 mm. and 0·2 mm. This general result agrees fairly well with the only measurement I have been able to find in the literature of the subject, namely that of *M. murrayi* by Quelch, which is given as 0·25 mm.

The question that had next to be considered was whether there is any other feature constantly associated with large pores and with small pores. The large pores are very constantly found in specimens with thick lamellæ or branches, while the small pores are found on those of a more slender habit.

A further investigation of the question yielded an explanation of the variation in the size of the gastropores, which proves that it cannot be of any real service for specific distinction.

I found that in the gastropores of specimens of slender growth there are only 3 or 4 tabulæ, while in those of more massive growth there may be as many as 9 or 10 tabulæ. This suggested that the size of the gastropores depends upon the age of the gastrozoid which lived in it, and, on measuring carefully a number of gastropores from the base, middle branches, and growing-points of a specimen in the Manchester Museum labelled *M. complanata*, I found that the average diameter of the gastropores at the base, which we may assume in this case to be the oldest part, was 0·185 mm., on a middle branch 0·17 mm., and at the growing-edge, *i. e.* the youngest part, it is only 0·13 mm. This general result was confirmed by similar series of measurements on other specimens. I also found that the greatest average diameter of gastropores which I have given above was obtained from the base of a massive specimen, while the smallest was obtained from a growing-edge of a slender specimen.

Moreover, it occurred to me that if the size of the gastropores is dependent upon their age or the rate at which the gastrozooids have grown, there ought to be, in some cases at any rate, a difference between the average size of the gastropores on one side of a branch or plate and that on the other; those on the face most favourable as regards food-supply in the living state should be larger than those on the other. Measurements confirmed my point, and I found a difference in two out of three specimens between the gastropores on one side and those on the other as great as 0·03 mm.

(3) *The Degree of Isolation of the Cycles.*—Moseley noticed that in one specimen of Millepore taken at Zamboanga the cycles were much more distinct than in other specimens, and suggested that this feature might be of specific value. After very careful consideration I am convinced that it cannot be. In many large specimens it will be seen that the cycles are much more distinct in one part than another. Sometimes the cycles are so crowded as to be indistinct at the edge, and perfectly clear on the face or at the base. The evidence points to the conclusion that in slow-growing Millepores in unfavourable situations the cycles are distinct, and that in fast-growing specimens in good situations the polyps are formed in such great numbers that the cycles become confused.

(4) *The Presence or Absence of Ampullæ.*—The ampullæ of *Millepora* were discovered by Quelch in a specimen obtained by the 'Challenger.' He founded a new species for the specimen, which he called *M. murrayi*, and used this feature as an important specific character.

I have found that ampullæ occur in plicate, ramose, and digitate specimens, and, as will be explained later, the absence of ampullæ in any particular specimen merely means that at the time it was taken it was not in a state of sexual activity.

It is greatly surprising how very rarely specimens are found in this particular condition, but I believe that it must occur in all varieties at one time or another in their life-history.

(5) *The Texture of the Surface of the Corallum.*—The species *M. verrucosa* of Milne-Edwards, *M. tuberculata* of Duchassaing, and *M. striata* of Duchassaing and Michelotti have been named after the peculiarities of their surface.

I have had an opportunity of examining a very fine specimen of a Millepore, resembling very closely the type of *M. verrucosa*, and I found that on the summit of a very large number of the verrucæ there is a small hole of the shape of a keyhole, which leads into a cavity formed by a parasitic cirripede (probably *Pyrgoma milleporæ*). On others, however, no such evidence of parasitic interference with normal growth is apparent from the surface, but nevertheless there is reason for believing that the tubercle may have been due to hypertrophy of the Millepore at a spot which was irritated by some parasite, the parasite subsequently being overwhelmed or killed.

Now it is not cirripedes alone which attack Millepores; various algæ, worms, crabs, and other creatures settle on the Millepores and cause profound modifications of their growth.

I think there is very good reason for believing that the warts, tubercles, ridges, and the like which occur on the surface of these corals are primarily due to parasites or to some other irritant, and that it is very doubtful whether they are ever of specific value. If they are to be used, however, it will be found that they lead to many difficulties, as it is not infrequently the case that one side of a lamella is tuberculate and the other is not, or that one lamella or branch is covered with wart-like processes and the others are smooth.

(6) *The Relative Number of Dactylopores and Gastropores.*—Finding that all other characters derived from the skeleton are unsatisfactory for determining and distinguishing species, I thought it possible that a good character might be found by calculating the average number of dactylopores to each gastropore in a number of species.

In many specimens the cycles are so close one to another that it is often difficult to determine to which cycle a particular dactylopore belongs. In order, therefore, not to be misled, I used only those cycles which were clearly defined from their neighbours.

In the following table I have put together the results of my calculations on this point:—

Accepted specific names of specimens. (The name of donor and locality in parentheses.)	Number of cycles counted.	Average No. of dactylopores in each cycle.	Highest number.	Lowest number.
I. *M. murrayi.* (Haddon, Torres Str.)	6	5·15	8	5
II. *M. alcicornis.* (Brit. Mus., W. Indies.)	8	6·45	8	5
III. *M. alcicornis.* (Shipley, Bermudas.)	6	5·6	7	5
IV. *M. alcicornis.* (Lister, Tonga.)	12 12	6·7 5·08	8 8	6 3
V. *M. plicata.* (Hickson, Celebes.)	12	7·08	9	6
VI. *M. complanata.* (Man. Mus., W. Indies.)	7 100	6·28 5·82	7 7	5 4
VII. *M. alcicornis.* (Man. Mus., W. I.)	7	6·14	7	5
VIII. *M. alcicornis.* (Agassiz, Bahamas.)	13	5·5	9	4

It will be seen from these figures that there is not much variation in the average proportion of dactylopores to gastropores in the different forms examined. The largest number of cycles I was able to count on one colony gave an average of a trifle under 6. It is noteworthy that this is the exact mean of the highest and lowest averages obtained from smaller specimens on which only a few cycles could be counted.

The extreme averages 5·08 and 7·08 (IV. & V.) do not show so great a range as may be seen on different parts of a single piece 9 and 4, and 8 and 3.

On the basal incrusting regions of a specimen of Millepore in the Manchester Museum I have observed several widely-separated gastropores attended by only one, two, or three dactylopores, and a similar paucity of dactylopores I have more recently noticed in specimens from the collection made by Mr. Gardiner in Funafuti and Rotuma.

I may point to the figures obtained from an examination of the specimens of *M. alcicornis* given to me by Mr. Lister to show the variability of this feature in the colony.

The specimens were a number of broken branches, each a few inches in length, beautifully preserved in spirit. Two specimens were taken at random and twelve cycles counted on each. The average of one came out 6·7 dactylozooids to each gastrozooid, and of the other 5·08 dactylozooids to each gastrozooid.

The only author who has referred to the number of dactylopores in each cycle is Moseley. He says that each group consists "of a centrally placed gastropore surrounded by a ring of five, six, or seven dactylopores," and on counting the number of dactylopores in each cycle that are drawn in Mr. Wild's picture in Moseley's 'Philosophical Transactions' paper I find that the average is 6.

In Milne-Edwards and Haime's figure of *M. intricata* there are 5 gastropores to 35 dactylopores; of *M. verrucosa*, there are 7 gastropores to 32 dactylopores (?); in *M. tuberculosa*, 5 gastropores to 18 dactylopores; but it is not certain that these figures can be absolutely relied upon. They are, however, on the whole, very similar to my own results.

The general conclusions, then, that must be drawn from these observations are:—

That the number of dactylopores in each group is very variable in each individual colony of *Millepora*. There may be, in fact, any number up to 8 or 9.

That specimens of widely different forms of growth have approximately the same average number of dactylopores in each group.

That the average number of dactylopores in each group for specimens of all kinds is about 6.

That the average number of dactylopores to each gastropore cannot be used as a specific character.

Anatomy of the Soft Parts.—I have examined the anatomy of the soft parts of a large number of specimens preserved in alcohol by mounting them whole and by making series of vertical sections. The following is a list of the specimens examined :—

Form of growth.	*Donor.*	*Locality.*
Digitate & palmate.	Prof Haddon.	Torres Strait.
"Alcicornis."	Mr. Shipley.	Bermuda.
"Alcicornis."	Mr. Lister.	Tonga.
"Alcicornis."	Prof. Agassiz.	Bahamas.
"Alcicornis."	British Museum.	W. Indies.
Ramose.	Mr. Gardiner.	Funafuti.
Plicate.	,,	,,
Foliate.	,,	,,
Striate.	,,	Rotuma.
Ramose.	Dr. Willey.	New Britain group.
Plicate.	,,	,,
(Several small fragments).	,,	,,
Complanate.	Mr. Duerden.	Jamaica.
"Exaesa."	Dr. von Marenzeller.	Red Sea.
"Dichotoma."	,,	,,

And a specimen of "Plicate" form obtained by myself in Celebes.

The preparation and examination of these Millepores has extended over a period of twelve years, with the result that I have failed to find any constant difference between them that can be used for the separation of the genus into species.

The structure of the gastrozooids and the dactylozooids is essentially the same in all the specimens examined, but the size varies somewhat, according to the position from which the preparations are made—those at the growing-edges being smaller than those at the base, &c. The canal-system is the same in all specimens. Zooxanthellæ of exactly the same size are always present in the superficial canals. I have observed the two different kinds of nematocysts, the large and small figured by Moseley, in all my preparations. Many of the Millepores are known to sting badly, and have received popular names in various languages expressive of this feature, but Mr. Gardiner informs me that one form in Funafuti did not sting. "It was at its base rather overgrown by weed, and above, curiously enough, it did not sting, and was the only one in Funafuti that did not." [1]

It is not known whether both the large and the small nematocysts possess the stinging-power, or whether it is confined to only one kind. The small nematocysts are confined to the tentacles of the gastrozooids and dactylozooids, and the large nematocysts, when ripe, occur in the superficial cœnosarc between the pores, but are specially crowded in the neighbourhood of the gastropores. Moseley's description of these features in *Millepora* is correct for all specimens I have examined. The size and the position of

[1] Extract from a private letter.

the small nematocysts render them difficult to measure, but the large nematocysts can be scraped off the surface of any preserved specimen in considerable numbers. The average size of these nematocysts when ripe in specimens from Celebes, Bermuda, Bahamas, Funafuti, Rotuma, the Red Sea, Jamaica, and New Britain is exactly the same—0·02 mm. × 0·025 mm. The number of the nematocysts varies considerably, but as this must be influenced by the manner in which the specimens were killed, and by external conditions affecting them before they were killed, no differences of specific value can be framed from this feature.

The general anatomy of all these forms is in other respects, as well as those mentioned, so much alike that I know of no means of distinguishing one series of sections of well-preserved material from another. There are no features of the soft parts which indicate in the least the general character of the form and structure of the skeleton they secreted.

By far the most interesting and in many respects the most important structures of these corals are the generative organs, and to them we should naturally turn for characters which might assist in distinguishing species. Unfortunately, however, our knowledge of these structures is very meagre and does not at present help us very much.

In the specimen presented to me by Prof. Haddon from Torres Strait, I discovered that the male sexual cells migrate into dactylozooids which become converted into medusæ. These medusæ, when ready to become free, are situated in ampullæ, which are approximately 0·4 mm. in their greatest diameter: that is, in holes in the skeleton larger than the largest gastropores. In another specimen of a different mode of growth presented to me by Mr. Gardiner from Funafuti I found numbers of these medusæ in ampullæ of exactly the same size. The medusæ of these two forms are quite indistinguishable one from another. It seems probable, then, that the Millepores from Zamboanga (Quelch), Jamaica, and several others from unknown localities in which ampullæ of this character have been described bore in the living state medusæ. No gaps similar to these can be seen in any of the preserved specimens which have been examined except those which contain or have contained medusæ. The fact that the largest ampullæ of all specimens are of approximately the same size, coupled with the fact that the medusæ of such different forms as those given me by Mr. Gardiner and Prof. Haddon are exactly similar, suggests that the medusæ of all Millepores are similar. At any rate, there is no evidence at present that there is any difference between the medusæ of the different forms.

It is a very extraordinary fact that the ampullæ are so rarely found. I have had the opportunity of examining carefully a very large collection of Millepores collected in the West Indies, and deposited in the Liverpool Museum. I failed to find a single ampulla in any one of them, but a small skeleton sent to me by Mr. Duerden from Jamaica exhibited an immense number of them.

In the large collection at the British Museum only a few specimens exhibit ampullæ.

It seems to be certain, then, that the medusæ are but rarely formed, but when they are they are formed in very great numbers.

General Considerations.—It appears to me that these investigations present very strong reasons for believing that there is only one species of *Millepora*. That one species must, on the ground of priority, be called *Millepora alcicornis*.

There are two courses open to us: either to assume that there are characters still undiscovered which distinguish one species from another, and on the strength of that assumption retain the old specific names; or to wait until such assumed characters are discovered before recognizing more than one species.

Of these two courses the latter appears to me to be preferable. If we consider a series of specimens, *a*, *b*, *c*, *d*, &c., are distinct species, we assume that the embryo of *a* gives rise to a definite form of coral, so like its parent *a* that it can be easily distinguished from the forms *b*, *c*, *d*, &c. If, on the other hand, we consider them as modifications in the form of one species, then we may consider it possible that under different external conditions the embryo of *a* may give rise to a form similar to *b*, or *c*, or *d*, or any intermediate or combined form of these varieties.

By the former course we are practically denying the possibility of considerable plasticity; by the latter course, while not assuming that it exists, we do not deny it.

Now the evidence in favour of the view that the Millepores are extremely plastic in their growth increases with every new collection that is examined. Nearly every large specimen shows some branch or plate that is distorted, twisted, compressed, or bent into a different shape from the rest of the coral; its surface shows galls, cups, tubes, warts for the accommodation of crabs, worms, cirripedes, algæ, and other so-called parasites. Nor is there any greater constancy of form in the smallest independent specimens that can be found. They may be simply incrusting, or may form a simple crest, or a short pointed process from the base, according to the character of the object on which they grow. It is therefore, in my opinion, not only extremely inconvenient but positively erroneous to consider those forms of growth that may be grouped round one "type" as a species distinct from those that can be grouped round another "type." By this plan we either deny the extreme degree of variability which there is reason to believe does occur in nature, or else we employ specific names in a sense altogether different from that in which they are used in the other groups of animals and plants.

It would be premature to propose to extend my remarks to other genera of corals, but I have already pointed out that there are some reasons for believing that there is not more than one species in the Alcyonarian genus *Tubipora* and the Hydrocoralline *Distichopora*. Our knowledge of the soft parts of *Madrepora* and other genera of Zoantharian corals is so small that it is possible that in the future a very considerable reduction in the species of this genus will also be necessary. *Madrepora* itself is a genus with a very wide geographical distribution in shallow tropical waters, like *Millepora*. Its coralla are also subject to extraordinary variability in their form of growth, and the species have been founded on skeletal characters only. All the species, or many of them, may be good, but the classification of the genus must be considered to be unsatisfactory until our knowledge of the anatomy of the polyps of the different varieties has been considerably extended.

2. On the Perforate Corals collected by the Author in the South Pacific. By J. Stanley Gardiner, M.A., Gonville and Caius College, Cambridge.

[Received January 31, 1898.]

(Plates XXIII. & XXIV.)

Of the Perforate Corals obtained by me in the South Pacific I have been able to refer specimens to fifty-one species; of these fifteen seem to me to be new. Three of these have already been described by Mr. Bernard in the British Museum Catalogue, and the characters of twelve are now given. I have so far as possible compared my specimens with those in the British Museum, and, although I have referred back to the original descriptions in nearly all cases, I give, for those genera of which the Museum has published a catalogue, simply one reference, namely to that catalogue, by placing the number of the species in it after the name in parentheses.

I am much indebted to Mr. Bernard for his assistance in comparing the *Astræopora* and *Turbinaria*, and for writing the description of *Montipora columnaris*. Prof. Jeffrey Bell, too, has kindly placed at my disposal every facility which the British Museum affords.

I. Genus Madrepora.

Madrepora Linnæus, Syst. Nat. ed. x. p. 793; Duncan, Rev. Madrep. p. 183.

The specimens of this genus in the collection are generally rather small, most of them having been obtained by diving or dredging. I have been able to refer specimens to 25 species, and in addition I have described 3 which I consider new. From Funafuti there are also fragments of two species from 30 fathoms, two from 20 f., and five from 6–8 f.: of these, four species seem to be new, but they are too small to attempt to describe. There are, too, a number of young colonies unidentified.

Generally, on the reefs of Rotuma and Funafuti I found that, although certain species are locally very common, there is little

[1] Communicated by W. Bateson, F.R.S., F.Z.S.